Plant Document Analysis

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End of Engineering Analysis Report

ENGINEERING SPECIFICATION ANALYSIS

Focus Area: Nozzle Load Analysis

Generated on November 18, 2025

Accepted Specifications for Evaluation of Nozzle Load Analysis

• Reference to API 650 Appendix P as the mandatory basis for "Allowable External Loads on Tank Shell Openings" (document states Appendix P is mandatory for design of openings when external piping load is specified).

• The document requires CONTRACTOR to provide calculations justifying acceptability of specified external nozzle and support pad loading (P.1.1).

• Table of mandatory tank nozzle design loadings (loads apply at the nozzle-to-shell junction) — nozzle loads to be used as minimum requirements (see Appendix P table in document). (Table source: Appendix P of the provided specification.)

• Explicit statement that nozzle loads higher than the table values may be specified by the CONSTRUCTION MANAGER and CONTRACTOR must confirm acceptability or advise maximum acceptable loading.

• Requirement (Vendor Data Requirement, 12.2.viii) that the Vendor/CONTRACTOR shall submit a Nozzle Load Analysis as part of the manufacturing & site erection submittals.

• Requirement (Appendix P) that CONTRACTOR shall provide calculations justifying acceptability of specified loading (i.e., deliverable and verification requirement).

• Statement that the specified loadings apply at the nozzle-to-shell junction (Appendix P).

Measurements Provided in Document

• Nozzle size 2 in and below: "Loads are considered negligible" (no numerical values).

• Nozzle size 3 in: Radial Load = 1000 N; Circumferential Moment = 200 Nm; Longitudinal Moment = 200 Nm.

• Nozzle size 4 in: Radial Load = 1500 N; Circumferential Moment = 300 Nm; Longitudinal Moment = 300 Nm.

• Nozzle size 6 in: Radial Load = 2500 N; Circumferential Moment = 700 Nm; Longitudinal Moment = 700 Nm.

• Nozzle size 8 in: Radial Load = 4000 N; Circumferential Moment = 1500 Nm; Longitudinal Moment = 1500 Nm.

• Nozzle size 10 in: Radial Load = 5000 N; Circumferential Moment = 2500 Nm; Longitudinal Moment = 2500 Nm.

• Nozzle size 12 in: Radial Load = 7000 N; Circumferential Moment = 4000 Nm; Longitudinal Moment = 4000 Nm.

• Nozzle size 14 in: Radial Load = 9000 N; Circumferential Moment = 6000 Nm; Longitudinal Moment = 6000 Nm.

• Nozzle size 16 in: Radial Load = 11000 N; Circumferential Moment = 8000 Nm; Longitudinal Moment = 8000 Nm.

• Nozzle size 18 in: Radial Load = 13000 N; Circumferential Moment = 10000 Nm; Longitudinal Moment = 10000 Nm.

• Nozzle size 20 in: Radial Load = 15000 N; Circumferential Moment = 13000 Nm; Longitudinal Moment = 13000 Nm.

• Nozzle size 24 in: Radial Load = 20000 N; Circumferential Moment = 18000 Nm; Longitudinal Moment = 18000 Nm.

• Note: The table states loadings for nozzles greater than 24 in NB are to be agreed between CONTRACTOR and CONSTRUCTION MANAGER.

Inputs and Additional Requirements from Client (as stated in the document)

• OWNER / CONSTRUCTION MANAGER will specify on relevant tank data sheet if any loads differ from standard; the OWNER will provide "basic configuration, service data, design requirements and all other applicable loads" on the tank data sheet (Definitions, 5.3 and other references).

• Vendor Data Requirement (12.2.viii): Nozzle Load Analysis must be submitted during Manufacturing & Site Erection stage.

• CONTRACTOR responsibility: confirm acceptability of the specified external nozzle and support pad loading or advise the maximum loading acceptable for the tank design (Appendix P).

• Load application point: loads shown in table apply at the nozzle-to-shell junction (Appendix P).

• If nozzle loads higher than table values are required, these will be specified by the CONSTRUCTION MANAGER (Appendix P).

• Minimum information/clarifications expected from CONTRACTOR per the spec: calculations justifying acceptability of the specified loading (Appendix P) — i.e., analytical justification/calcs are required.

• Deliverable format/quality: vendor documents (including nozzle load analysis) must be submitted in the electronic/pdf format and conform to the Vendor Document/Data Format instructions (Attachment-2, sections 1–3).

• Note in document relevant to nozzle design: "Nozzle flanges above 24" NB (except man ways) shall be as per ANSI B16.47 Series – B Type" (5.7.6.1 Addition) — affects flange geometry/interface loads if applicable.

• Reference to API 650 Table 5.6a for minimum distance from bottom to centre line of any nozzle or manway (5.7.6.4 Addition) — the spec states the minimum distance shall be as per API 650 Table 5.6a (impacts load application location and reinforcement).

Strict adherence notes

• Items listed above are extracted verbatim from the supplied specification and are limited to information explicitly present in the document and directly relevant to Nozzle Load Analysis.

• No additional inference, calculations, or assumptions have been made.

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